

What is claimed is:

1           1.     An apparatus for assessing operation of a system under test, the  
2     system being operable to process at least one video signal and a plurality of  
3     audio signals corresponding to audio channels, the apparatus comprising:  
4           a source of an audio-video program signal in a digital format having  
5     successive samples of video data and accompanying audio data for plural  
6     audio channels, the source being coupleable to an input of the system under  
7     test;  
8           an audio mark generator and a video marker generator, wherein the  
9     audio mark generator and the video marker generator respectively produce  
10    audio and video data for processing through the system under test;  
11          wherein the audio mark generator and the video mark generator are  
12    operable upon initiation of a test cycle to insert data into the program signal at  
13    the input to the system under test, the data representing an audio mark for a  
14    selected one of the audio channels and a video marker having a predetermined  
15    timing relationship, said audio mark and said video marker being thereby  
16    applied as the input for processing by the system under text;  
17          a detector coupleable to an output of the system under test, wherein the  
18    detector is operable to receive the program signal, and to sense a timing  
19    relationship of the data representing the audio mark for at least one of said  
20    audio channels versus the video marker, at the output of the system under test;  
21    and,  
22          at least one of an audio and visual output coupled to the detector for  
23    presenting a sensed result of said timing relationship.

1           2.     The apparatus of claim 1, wherein the audio mark generator and  
2     the video mark generator are configured to apply the audio mark successively  
3     to one serial digital audio channel and an next serial digital audio channel,  
4     proceeding through said audio channels.

1           3.     The apparatus of claim 1, wherein the detector is operable to test  
2     at least one audio channel in addition to said selected one of the audio  
3     channels on which the audio mark was applied to the input for processing by  
4     the signal under test.

1           4.     The apparatus of claim 1, wherein the output coupled to the  
2     detector presents a time difference and an leading/lagging indicator for showing  
3     which of the audio mark and the video mark preceded the other at the output of  
4     the system under test.

1           5.     The apparatus of claim 3, wherein the detector is operable to test  
2     each of said plurality of audio channels for the audio mark.

1           6.     The apparatus of claim 1, the output coupled to the detector  
2     comprises an audio meter display having a variable indicator for each of the  
3     audio channels, and wherein the audio meter display momentarily depicts the  
4     audio mark when applied to and sensed on the audio channel.

1           7.     The apparatus of claim 6, further comprising a numeric readout  
2     operated by the detector to show a numeric period of time between detection of  
3     the video mark and detection of the audio mark on any one of a number of  
4     channels represented on the audio meter.

1           8     The apparatus of claim 6, wherein the audio meter is configured to  
2     provide for a variation in display readout upon detection of a mismatch wherein  
3     the audio mark is sensed on a channel that differs from a channel on which the  
4     audio mark was applied at the input.

1           9.     The apparatus of claim 1, wherein at least one of the video mark  
2     and the audio mark is applied in a nominal manner whereby one of a video  
3     receiver system coupled to the system under test shows a mark visibly in a

4 video display and an audio speaker coupled to the system under test produces  
5 an audio mark corresponding to the output of system under test.

1 10. A method for testing a digital video processing system operable to  
2 process video samples and embedded audio samples, comprising the steps of:  
3 providing a digital signal in a format providing for a succession of  
4 digitized audio and video samples;  
5 inserting into the digital signal a video marker and at least one audio  
6 marker, the video marker and the audio marker having a predetermined timing  
7 relationship and the audio marker being associated with a predetermined one of  
8 a plurality of audio channels;  
9 processing the digital signal through a video processing device having an  
10 arbitrary effect on at least one of an audio and a video portion of the digital  
11 signal;  
12 sensing for the video marker and the audio marker at an output of the  
13 video processing device;  
14 timing a difference between appearance of the audio marker and the  
15 video marker at said output of the video processing device; and,  
16 reading out said difference.

1 11. The method of claim 10, wherein the predetermined timing  
2 relationship is achieved by placing the audio marker at a predetermined timing  
3 position associated with a marked frame of video data.

1 12. The method of claim 10, further comprising reading out an order  
2 of which of the audio and video markers was found to be leading and lagging  
3 the other of the audio and video markers.

1 13 The method of claim 10, further comprising testing for received  
2 audio on a plurality of accessible channels in addition to the predetermined one  
3 of the audio channels.

1           14. The method of claim 13, comprising applying the audio marker  
2 successively to each of the plurality of accessible channels in turn, for purpose  
3 of identification of said predetermined one of the audio channels, and further  
4 comprising testing for the received audio marker on each of the plurality of  
5 accessible channels in addition to said predetermined one.

1           15. A method for testing a digital processing system operable to  
2 process audio signals for multiple channels, comprising the steps of:  
3           providing a digital signal in a format providing for digitized audio samples  
4 for said multiple channels;  
5           inserting into the digital signal at least one audio marker so as to  
6 distinguish a subset of at least one of said multiple channels from at least one  
7 other of the multiple channels by virtue of said audio being inserted into the  
8 subset and not into said at least one other;  
9           processing the digital signal through a signal processing device having  
10 an arbitrary effect on an audio portion of the digital signal; and,  
11           sensing for the audio marker at an output of the signal processing device  
12 corresponding to the subset distinguished by said audio marker being inserted  
13 therein, and further comprising sensing for the audio marker on at least one  
14 other of the multiple channels so as to determine a mismatch in channel  
15 integrity through said signal processing device.

1           16. The method of claim 15, wherein the digital signal is a video signal  
2 having an audio portion and a video portion, and comprising also inserting a  
3 marker into the video portion with a predetermined timing relationship to said  
4 audio marker, and further comprising sensing for relative timing effects caused  
5 by the signal processing device, by monitoring for changes relative to the  
6 predetermined timing relationship at an output of the signal processing device.

1           17.    The method of claim 16, wherein the marker in the video portion is  
2           inserted into active video and includes an indicia that is visible in playback of  
3           the video portion on a monitor device.

1           18.    The method of claim 16, further comprising exercising the audio  
2           and video portions by inserting at least one of active audio and video signals  
3           that are discernible in playback of the audio and video portions.

1           19.    The method of claim 18, further comprising marking and  
2           exercising each of the multiple channels by inserting a marker therein,  
3           proceeding one at a time.